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(54) Title: A SET-TOP BOX WITH AN INTERNET BIOS FOR INTERNET ACCESS
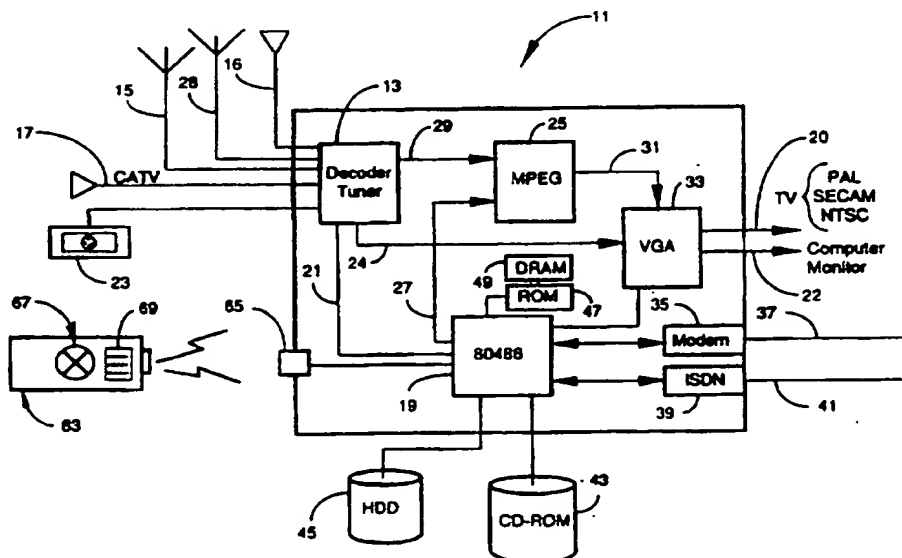
(57) Abstract

A set-top box for receiving and decoding data streams to provide video display on a display monitor (20, 22) has a unique Internet BIOS (IBIOS) adapted for providing a user interface on a connected display monitor (20, 22), providing facility for a user to access and display Web pages from the Internet World Wide Web. The IBIOS is installed in a non-volatile memory (47), and comprises a basic input output (BIOS) code set, an operating system, a Transfer Control Protocol/Internet Protocol (TCP/IP) code set, an embedded Web Browser application, and a top managing application. The set-top box is computer based, and has, in various embodiments, various capability for receiving and decoding incoming data streams and providing display from the data streams on a connected display monitor (20, 22), which may be a television set (20) or other monitor (22).

A Set-Top Box With an Internet BIOS
for Internet Access

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Field of the Invention

The present invention is in the area of multimedia apparatus and
10   methods, and pertains more particularly to integrating operating code for
Internet access and browsing functions with a set-top box adapted for
receiving a digital data stream from a variety of sources and providing
video output from the incoming data stream.

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Background of the Invention

Set top boxes adapted primarily for receiving and processing
typically digital data, and providing signals from the received data to drive
a television screen have been recently developed and marketed. Such
20   boxes typically have inputs for such as a TV antenna (analog), cable TV
(analog or digital), more recently direct-satellite TV (digital), and may also
connect to mass storage devices such as hard disk drives and CD-ROM
drives to provide a capability for uploading video data from such drives
and presenting the dynamic result as a display on a TV screen.
25   As has been true in the computer marketplace in general, the
market for multi-media equipment such as set-top boxes has been
characterized by a rapid pace in development of new and enhanced
capabilities. This rapid development is driven in part by rapid
development of computer equipment, but has other dimensions as well.
30   One of these other dimensions is the emergence of on-line data services
and Internet phenomena, such as the World Wide Web (WWW), often
referred to as "the Web" which will be done as well in this specification.
The Web is a phenomenon that has been directly associated with
high-end personal computers (PCs). A computer platform with sufficient
35   power and memory to operate well with Microsoft Windows™ and with a
video monitor with color and relatively high resolution is needed for
satisfactory Web access and use.

This association of Web access and use with relatively high-end personal computers has restricted Web growth (although this growth has been indeed phenomenal) to users with relatively well-developed computer skills. Very little has been done to provide web access to those
5   who may not be inclined to own or interface with a PC directly. Moreover, little has been done to integrate TV reception. and televisions in general with the Internet or the Web on the Internet.

What is needed is an integration of computer technology with a set-top box in a manner that Web access may be provided, with display on
10   a TV (or optionally on a connected computer video monitor) in a manner that Internet and Web access may be provided in a simplified manner for those who are not inclined to deal with high-end personal computers. or to deal with the intricacies of installing software packages. interfacing with an Internet service provider. or browsing with conventional browsing
15   tools.

A difficulty with this unique concept of integrating a set top box with a computerized apparatus adapted for Web browsing is the threshold complexity of computers needed to provide Web access and browsing capability. Considerable mass storage space is needed for all of the
20   applications required to provide such functionality. For example. in a typical high-end personal computer adapted for Internet access and Web browsing. one usually has *at the least* the computing power of an Intel-equivalent 80486 central processing unit (CPU). a random-access memory (RAM) capacity of at least eight megabytes of data, a mass storage
25   capacity of 100 megabytes or more (typically much more). and a high-resolution video-graphics adapter (VGA) color monitor. A high-speed modem is also required for analog telephone access to the Internet, or an Integrated Services Digital Network (ISDN) interface. where ISDN is available. Of course, in most cases. the computer platform is much more
30   sophisticated and powerful than this minimum system.

The high-capacity mass storage in a conventional Web-capable computer platform is needed, among other things. for storage of all of the operating code (software) that is required. This software typically comprises an operating system (Windows™ or a competent substitute), a
35   version of a compatible disk operating system (DOS) code, for accessing computer peripherals, such as a hard disk drive that might be included in

such a system, a Transfer Control Protocol/Internet Protocol (TCP/IP) interface software package for Internet communication, and a browser application for Internet browsing and searching. The cost of this list of applications and the mass storage space to store them is considerable.

5   For a set top box to have functionality for Internet access and Web browsing, the set top box has to have a powerful CPU, considerable mass storage space, and at least the software described above. For the set top box to have a unique user interface that does not require a user to be an experienced computer user requires even more software.

10   What is needed is a set top box with sufficient applications for Internet access and Web browsing, and with the applications stored and accessed in a manner substantially less expensive than the conventional ways used with high-end computers. Moreover, the system needs an interactive interface that takes into account the marketplace, where most

15   potential users are not experienced computer users. A unique system according to various embodiments of the present invention is described in detail below.

Summary of the Invention

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In a preferred embodiment a set top box system for video data processing is provided, comprising a central processing unit (CPU) for system management; a video graphics circuit connected to the CPU and having an output for driving a display monitor; an Internet access link; and

25   an integrated non-volatile memory connected to the CPU and having a basic input output system (BIOS) code set, an operating system, a Transfer Control Protocol/Internet Protocol (TCP/IP) code set, an embedded Web Browser application, and a top-managing application. The top-managing application is adapted to provide a user interface on a connected display

30   monitor, providing facility for a user to access and display Web pages from the Internet World Wide Web. In one embodiment the operating system includes a ROM DOS code set and a graphical user interface.

In alternative embodiments of the invention the set-top box has additional components and functionality. For example, a decoder

35   connected to at least one video data input stream and to the CPU and to the Video Graphics circuit. The decoder may be a decoder/tuner

connectable to one or more of a cable TV line, a satellite TV antenna, and a video cassette recorder/player (VCR). In other embodiments there is a Motion Picture Experts Group (MPEG) decoder coupled to the CPU, the decoder/tuner, and the video graphics circuit.

A preferable graphics circuit in man embodiments is a circuit conforming to the well-known Video Graphics Array (VGA), the circuit adapted for driving display monitors of several sorts, such as televisions and computer terminal monitors. The CPU may be any one of several well-known types or models, and an 80486-compatible microprocessor is preferred in many embodiments.

In an alternative embodiment the system of the invention includes a Smart Card reader connected to the decoder/tuner, and the decoder tuner is adapted for decoding Smart Card input and providing data therefrom to the CPU. The Internet access link may be either of an analog telephone data modem or an Integrated Services Digital Network (ISDN) modem, or other type, such as a satellite link.

In yet another embodiment the system includes a CD-ROM drive coupled to the CPU, and the top managing application is adapted to provide a user interface on a connected display monitor, providing facility for a user to play video programs from the CD-ROM and to access and display Web pages from the Internet World Wide Web. In this and other embodiments the system comprises a receiver/decoder for infra-red signals from a remote infra-red controller, and the user may manipulate the user interface by cursor manipulation from the infra-red controller. Other embodiments may have other mass-storage facilities, such as a hard disk drive coupled to the CPU.

An important component of the system is a BIOS coded in a non-volatile memory, wherein the BIOS comprises a basic input output system (BIOS) code set; an operating system including a ROM DOS code set; a Transfer Control Protocol/Internet Protocol (TCP/IP) interface code set; an embedded Web Browser application; and a top-managing application. The top-managing application is adapted for execution by a CPU to provide the interactive user interface on a display monitor, and the interactive user interface provides access to World Wide Web pages on the Internet. The Internet BIOS in one embodiment is coded in a Flash ROM, which allows for electronic reprogramming and diagnostics.

In yet another embodiment of the invention a method is provided for accessing and browsing the World Wide Web (WWW) on the Internet, comprising steps of (a) booting a computerized set top box from an execute-in-place (XIP) BIOS in a non-volatile memory, the set top box
5 having a CPU, a modem connected to a telephone line, and a video graphics circuit driving a display monitor; (b) executing a managing application also XIP in the non-volatile memory, providing thereby Internet access through the modem and displaying a browser interface on the display monitor, the access software and the browser software also
10 XIP in the non-volatile memory; and (c) jumping to Web sites from the browser interface.

In still another embodiment a method is provided for providing World Wide Web access to user's while maximizing ease of use, comprising steps of (a) coding a non-volatile memory with a basic input
15 output system (BIOS) code set, an operating system, a Transfer Control Protocol/Internet Protocol (TCP/IP) code set, an embedded Web Browser application, and a top managing application; (b) connecting the nonvolatile memory to a CPU in a computerized set top box having the CPU, a video graphics circuit with an output driving a display monitor,
20 and an Internet access link; and (c) booting the computerized set top box from the BIOS code in the non-volatile memory directly into the top managing application, which establishes Internet access via the Internet access link, and provides a Browser Interface on the display monitor.

In still another embodiment a method is provided for a CD-ROM
25 subscription service, comprising steps of (a) soliciting subscribers having a set top box connected to a display monitor including a CD-ROM drive; (b) ascertaining interest categories of individual groups of subscribers; (c) perusing Internet Web sites for sites fitting the interest categories of the individual groups of subscribers; (d) coding the URLs of the Web sites of
30 interest to the individual groups of subscribers on CD-ROM disks in a manner that, upon the disks being read in the CD-ROM drives, the URLs are displayed on the; and (e) providing the CD-ROM disks to the subscribers.

The system of the present invention in all its various aspects and
35 embodiments provides a unique and easy-to-use facility, especially for those persons not experienced in computer set-up and operation, to access

many forms of data input for information and entertainment, and to display the result in a manner familiar to such persons, while providing also for control of the system in a manner also familiar to such users. Details of the invention are provided in disclosure below, and the

5   invention in various aspects is defined in the claims following the detailed descriptions.

Brief Description of the Drawings

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Fig. 1 is a block diagram of a set-top box according to a preferred embodiment of the present invention.

Fig. 2 is a diagrammatical illustration of a Flash ROM according to an embodiment of the present invention, such as is used in the set top

15   box of Fig. 1.

Fig. 3 is a representation of a top-level interactive interface provided in one embodiment of the present invention.

20   Description of the Preferred Embodiments

Fig. 1 is a block diagram of a set-top box 11 according to a preferred embodiment of the present invention. In this box a decoder/tuner 13 receives signals from a variety of sources, such as

25   satellite link 15, a cable TV line 17, and a VCR input 16. An 80486 CPU 19 provides management and computing ability, and is connected to decoder/tuner 13 by link 21. Decoder/tuner 13, besides accepting and decoding satellite signals on link 15, Cable TV signals on line 17, and VCR video signals on line 16 also is connected in this embodiment to a

30   reader 23 for Smart Cards. Smart Cards inserted in reader 23 are read and decoded by decoder/tuner 13, which in turn provides data from the Smart Cards to CPU 19. The purpose and functions of optional Smart Card access to the set top box is described more fully below.

In addition to the CPU and decoder/tuner, there is a Motion Picture

35   Experts Group (MPEG) decoder 25 for interpreting data provided to the set top box in MPEG I and MPEG II format, and for providing signals

therefrom to drive a TV or a video monitor. MPEG is an industry standard protocol for video data. and is well known in the art.

MPEG decoder 25 is connected directly to CPU 19 by link 27 and to decoder/tuner 13 by digital link 29. MPEG decoder 25 has an output
5 line 31 to a video graphics adapter (VGA) chip or chip set 33, including video ram (VRAM). The VGA chip set is adapted for driving a TV screen or a computer display screen via conventional circuitry. Output 20 provides TV format in any of PAL, SECAM, or NTSC formats, and may, in other embodiments provide other protocols as well. Output 22 provides
10 well-known VGA output to drive a computer display monitor. In other embodiments of the invention other sorts of video circuitry might be used.

For analog TV an analog antenna input 28 is provided. and a direct analog line 24 goes to the video graphics circuitry.

An analog telephone modem 35 connects to a telephone line 37
15 and to CPU 19, providing communication with a remote location for pay-TV transactions and diagnostic and downloading services. An optional ISDN interface 39 in this embodiment connects to an optical digital data cable 41 and to CPU 19 for digital telephone communication, which may be used instead of or in addition to analog modem 35. There are optional
20 interfaces provided also for a compact-Disk Read-Only Memory (CD-ROM) drive 43 and a hard disk drive 45. The CD-ROM is a particularly important feature in some aspects of the present invention, and MPEG formatted video data from the CD-ROM can be provided to MPEG decoder 25 for presentation on a connected TV or display monitor.

25   . In set top box 11, all necessary operating code, including basic input-output system (BIOS) functions. are provided by a flash read-only memory (Flash ROM) 47, termed by the inventor the IBIOS, for Internet BIOS. connected to a relatively small dynamic RAM (DRAM), the whole connected to CPU 19. In other embodiments other sorts of non-volatile
30 memory might be used. Further description of the IBIOS is provided below according to embodiments of the present invention.

It will be apparent to those with skill in the computer arts that the communication links indicated in Fig. 1 for set top box 11 are illustrative of data flow. and are not meant to indicate the type or bandwidth of
35 specific links. It is well known, for example, that CPUs of the sort described communicate on parallel buses with bus cycles controlled by

bus controllers in an industry standard fashion, such as an ISA bus, an EISA bus, and the like.

Fig. 2 is a diagrammatical illustration of a 1 megabyte Flash ROM 47 according to an embodiment of the present invention. Flash ROM 47
5   in this embodiment comprises embedded applications for all of the functionality required for set top box 11, and is connected to a 1 megabyte scratch DRAM 49. Code is execute-in-place (XIP) rather than loaded into RAM and then executed, so DRAM 49 is kept to a minimum. The purpose of DRAM 49 is temporary variable storage during execution of
10   XIP applications.

Flash ROM 47 in the embodiment of Fig. 2 has six embedded XIP applications. In other embodiments there could be more or fewer such applications. A BIOS 51 of about 64 kilobytes provides Power On Self Test (POST) and other preliminary BIOS functions, and boots into a Top
15   Application 61, which provides a user interface to be described more fully below.

An embedded ROM DOS 53 provides DOS functions for system operation. Such embedded DOS-compatible applications are commercially available, such as ROM-DOS™ 6 by Datalight
20   Incorporated. The DATALIGHT ROM-DOS occupies about 73 kilobytes. A interactive Graphical User Interface (GUI) 55 provides screen graphics and multitasking capability. GUI 55 occupies about 128 kilobytes. A commercially available Windows-like system such as WinLight™ available from Datalight Incorporated is one option for the
25   GUI. In this embodiment the ROM DOS and the GUI comprise an operating system (OS).

Top Application 61 has access to a TCP/IP interface program 57 for Internet communication. The TCP/IP interface is also embedded and XIP, and program 57 occupies about 64 kilobytes. Finally, a browser 59
30   is provided embedded and XIP for Internet browsing operations with access to the TCP/IP interface software.

It will be apparent to those with skill in the software and programming arts that there are a number of different candidates commercially available that might be incorporated into the IBIOS, and
35   that new code performing equivalent functions may also be written uniquely for the IBIOS.

User Interface and Operation

Optional Smart Card reader 23 described above and connected to
decoder/tuner 13 provides an optional user input port for data and
encryption keys for enabling functions and decoding for such as pay
channels. Data and entertainment providers may make their products
available by any of the several data stream inputs described above, such as
satellite direct TV, cable TV, CD-ROM, or even ISDN link, and provide
smart cards to clients with decryption keys so a user may enable the
purchased product. In other embodiments with or without optional Smart
Card readers, keys and other security features may be provided in other
ways.

In an alternative embodiment of the invention, a user will
subscribe to a periodic CD-ROM service for a small fee per period, such
as monthly. The CD delivered each month will provide a broad range of
functions and products in alternative embodiments. For example, such a
CD-ROM may provide an updated index of Internet sites with Universal
Resource Locators (URLs), an index of pay entertainment events available
on one or more of the several data stream inputs in the coming month,
along with access keys, and may also have one or more MPEG video
selections on the disk. In keeping with the purpose of providing Internet
access to those who prefer not to use a computer, the CD-ROM service
will do at least some browsing for the subscriber, and will present the
result as selectable URLs to which the system may jump on command.

In one embodiment of the present invention the CD-ROM service
will be the primary, and perhaps the sole data input stream. In this
embodiment there will be no decoder/tuner 13, and no inputs for cable TV,
satellite TV or Smart Cards.

In one embodiment the user interface comprises an infra-red
remote control box 63, of the type of the familiar remote control boxes
commonly used for sending user commands to such as TVs, video cassette
players, and the like. In this embodiment there will be an infra-red
receiver/decoder 65 connected to CPU 19 for receiving infra-red coded
signals from remote controller 63.

Remote control box 63 in this embodiment comprises, at a

minimum, a four-way pushbutton 67 for cursor control, and one or more buttons 69 for interactive selection.

Fig. 3 is an idealized representation of a top-level interactive display 71 provided on a display monitor screen 73 by execution of Top Application 61 (Fig. 2). Screen 73 may be the screen of a television connected to set top box 11 at the TV output from VGA circuitry 33, or other video monitor, such as a computer monitor. It will be apparent to those with skill in the art that there are many sorts of display monitors that might be used, including flat screens and large, tiled displays. In some cases driving hardware may be added at the video output to drive newly-developed display devices.

Interactive display 71 is similar in layout to preview screens such as provided by conventional satellite TV services, and already familiar to many users, but has considerably increased functionality. The display is provided, as indicated above, by execution of Top Application 61, which remains active in the background at all times the set top box of the invention is in use.

A user operates the system in this embodiment by using four-way pushbutton 67 (Fig. 1) to move a cursor 75 over the area of interactive display 71. By moving cursor 75 to an active area of the display, and pressing an activation key, such as one of the buttons 69 on remote control box 63, the user can signal the system to initiate a display based on one or another of the input data streams. In other embodiments cursor control and selection may be by a pointer device connected to CPU 19, or by input from a keyboard connected to CPU 19. It will be apparent to those with skill in the art that there are a variety of cursor control and selection alternatives known in the art, and any one or more of such alternatives may be incorporated in alternative embodiments of the present invention. The use of an infra-red remote is compatible with the object of providing Internet Access and browsing to users not particularly computer-friendly.

In example display 71 a top line 77 provides selectability among the several data input streams that may be made available. There are, for example, selectors 79, 80, 81, and 83 in top line 77 in the embodiment shown for allowing a user to select cable TV, VCR input, CD-ROM, or Satellite TV, respectively. There may, in some embodiments, be further selectors, such as for other input data streams, a hard disk drive, for

example.

The body of display 71 below top line 77 is devoted to a channel vs. time matrix of program selections based on whichever data input stream is currently active, at least for those input data streams, like cable
5   or satellite TV that have channels and time-based programming. For some other kinds of input data streams, such as CD-ROM, Hard disk inputs, or VCR input, wherein a user may download data that is available at any time, the display is arranged differently.

If one selects cable TV with selector 79, for example, the body of
10   the display will provide channel numbers 93 vs time, with time indicated across the top of the body of the display on line 95. In the matrix, individual programs being broadcast by channel and time are displayed. The time spread is necessarily limited to about three hours left-to-right, but may be panned in a manner described below. A user may use a scroll
15   bar 97 or similar device to scroll the channel selections.

A date field 85 is provided in top line 77, which, when the top application is first accessed, displays the current date by default. A user may use selectors 87 and 89 to move ahead in time or back to the current date. As the user moves ahead in time, the hourly time spread on line 95
20   changes, and when the next date is reached, the date indication 85 changes.

In these examples, a user may move the cursor to any program selection provided by any one of the input data streams and select the program, whereupon the system will initiate that program, such as by
25   jumping to the particular cable TV or satellite channel selected. If the user selects a video, the video will immediately begin to play, but there will also be controls on the remote for stopping and restarting, moving ahead or back in the video timeline. In all cases there will remain on the display, provided by the top application, an active area that a user may select to
30   return to the display of Fig. 3.

IN the case of VCR control, a familiar interface for high-level VCR programming is displayed, as is known in the art, and a user may use the cursor controls and selection keys to program a connected VCR. When a VCR tape is played, an interactive icon is displayed as well that
35   allows a user to call up a control panel for stopping, starting, fast forward, slow motion, and the like, which sorts of control are well known in the art.

In some embodiments of the invention, known Pix-in-Pix and opaque overlays are provided, wherein a user may have dispay from more than one input data stream acitvated simultaneously. For example, one could have a program from cable TV in a window on a TV screen smaller than the principle display, and a video from a CD-ROM on the principle display. The facilities for such overlays and mixed displays are well-known in the art, and controls may be either of dedicated buttons on the remote or selecatable on-screen icons and the like.

There is one more, and unique, selection a user may make from the top-level display 71 of Fig. 3. Selector 91, labeled Browse, activates Internet Access and Browse function in an embodiment of the present invention. If a user selects Browse, the Top Application establishes Internet Access via modem 35 or ISDN link 41 (if available), and present a browser interface, as is known in the art. From this point, operation can be as is known in searching the WWW or jumping directly to known destinations. In this embodiment of the invention, Universal Resource Locators (URLs) are transparent to the user, and provided in a manner described more fully below.

In the embodiment introduced above wherein a CD-ROM subscription service is used, a user will insert a CD-ROM disk, which may come in the surface mail once a month, or at some other period of time or in another sort of delivery service, and the system will present on display 71, assuming of course that selector 83 is activated, those MPEG selections coded on the CD-ROM. In alternative embodiments, considerable further functions are provided by the CD-ROM subscription service.

In one CD-ROM service embodiment, user's indicate information and entertainment preferences at the time of subscription, which may be updated periodically. A uscr may, as a simple example, indicate an interest in American History and in Spy Thriller movies. The CD-ROM for that person will then be customized by tagging all new information available in the particular data streams to which that user is connected that are in the area of interest. With the subscribed CD-ROM disk in a connected drive, the top application uses the tags to highlight the listing of the tagged programs and destinations in the matrix of selections provided on the interactive interface. Listings in the matrix may be underlined.

boxed, enhanced by color, enhanced in brightness in the display, or highlighted in some other manner.

In alternative embodiments, preferences may be entered in a subscription for different family members, and as indicated, the
5   preferences can be canceled or updated periodically. In the multiple member subscriptions, there will be either or both of a facility for a family member to identify himself/herself, or highlighting will be distinguished by family member. In even more sophisticated embodiments, the top application is capable of providing a presentation to the subscriber when
10   first activated, listing abstracts and even previews of tagged interest items.

In the case of Internet destinations, the matrix display of the top application is not provided as a channel/time matrix, as for TV channels, but on an alternative matrix, such as listed by type. WWW destination types can be indexed in many ways, such as by commercial destinations,
15   information type (genealogy/history/politics/etc.), magazines, newspapers, and so on. Items may be highlighted by subscription interest as well, and, in some embodiments, new "hot" destinations will be highlighted. A user may, in addition, select preprogrammed tours of hot WWW destinations.

It will be apparent to those with skill in the art that there are a
20   broad variety of designs and functionality for the user interface, and also a broad variety of sources of data that may be connected and included in the available selections for the user interface.

It will be apparent to the skilled artisan also that there are many alterations that may be made in embodiments of the invention herein
25   described without departing from the spirit and scope of the invention. Many of these alternatives have been described above. There are many sources, for example, of data streams that may be connected and controlled to provide display on a connected display monitor. There are similarly many alternatives for interactive interfaces, for web browser
30   applications and the like, and for organization and design of the set top box itself.

What is claimed is:

1. A set top box system for video data processing, comprising:

a central processing unit (CPU) for system management;

a video graphics circuit connected to the CPU and having an output for driving a display monitor;

an Internet access link; and

an non-volatile memory connected to the CPU and having a basic input output system (BIOS) code set, a ROM DOS code set, an operating system, a Transfer Control Protocol/Internet Protocol (TCP/IP) code set, an embedded Web Browser application, and a top-managing application;

wherein the top-managing application is adapted to provide a user interface on a connected display monitor, providing facility for a user to access and display Web pages from the Internet World Wide Web.

2. A set top box as in claim 1 additionally comprising a first decoder connected to at least one video data input stream and to the CPU and to the Video Graphics circuit.

3. A set top box as in claim 2 wherein the first decoder is a decoder/tuner connectable to one or more of a cable TV line, a satellite TV antenna, and a video cassette recorder/player (VCR), and additionally comprising a Motion Picture Experts Group (MPEG) decoder coupled to the CPU, the decoder/tuner, and the video graphics circuit.

4. A set top box as in claim 1 wherein the video graphics circuit is adapted for video graphics array (VGA) output and for driving a television screen.

5. A set top box system as in claim 1 wherein the CPU is an 80486-compatible microprocessor.

6. A set top box as in claim 2 additionally comprising a Smart Card reader, wherein the first decoder is adapted for decoding Smart Card input and providing data therefrom to the CPU.

7. A set top box as in claim 1 wherein the Internet access link is one of an analog telephone data modem and an Integrated Services Digital Network (ISDN) modem.

8. A set top box as in claim 3 additionally comprising a CD-ROM drive coupled to the CPU, wherein the top managing application is adapted to provide a user interface on a connected display monitor, providing facility for a user to play video programs from the CD-ROM and to access and display Web pages from the Internet World Wide Web.

9. A set top box as in claim 1 further comprising a receiver/decoder for infra-red signals from a remote infra-red controller, wherein the user may manipulate the user interface by cursor manipulation from the infra-red controller.

10. A set top box as in claim 1 additionally comprising a hard disk drive mass storage device coupled to the CPU.

12. A set top box system for video data processing, comprising:

a central processing unit (CPU) for system management;

a video graphics circuit connected to the CPU and having an output for driving a display monitor;

a Motion Picture Experts Group (MPEG) decoder connected to the CPU and the video graphics circuit, for decoding data provided in MPEG format;

a decoder tuner coupled to the CPU and the MPEG decoder, and connectable to at least one video data input stream;

at least one of an analog telephone data modem and an Integrated Services Digital Network (ISDN) modem;

a compact disk read-only memory drive coupled to the CPU; and

a non-volatile memory connected to the CPU and having a basic input output system (BIOS) code set, an operating system, a Transfer Control Protocol/Internet Protocol (TCP/IP) code set, an embedded Web Browser application, and a top managing application;

wherein the top managing application is adapted to provide a user interface on a connected display monitor, providing facility for a user to

play video programs from the CD-ROM and to access and display Web pages from the Internet World Wide Web.

13. A BIOS coded in a non-volatile memory, comprising:

a basic input output system (BIOS) code set;

an operating system;

a Transfer Control Protocol/Internet Protocol (TCP/IP) interface code set;

an embedded Web Browser application; and

a top-managing application;

wherein the top-managing application is adapted for execution by a CPU to provide an interactive user interface on a display monitor, the interactive user interface providing access to World Wide Web pages on the Internet.

14. A BIOS as in claim 13 wherein the non-volatile memory is a Flash ROM.

15. A method for accessing and browsing the World Wide Web (WWW) on the Internet, comprising steps of:

(a) booting a computerized set top box from an execute-in-place (XIP) BIOS in a non-volatile memory, the set top box having a CPU, a modem connected to a telephone line, and a video graphics circuit driving a display monitor;

(b) executing a managing application also XIP in the non-volatile memory, providing thereby Internet access through the modem and displaying a browser interface on the display monitor, the access software and the browser software also XIP in the non-volatile memory; and

(c) jumping to Web sites from the browser interface.

16. The method of claim 15 wherein the modem is an analog modem connected to an analog telephone line.

17. The method of claim 15 wherein the modem is a Integrated Services Digital Network (ISDN) modem connected to and ISDN optical telephone line.

18. A method for providing World Wide Web access to user's while maximizing ease of use, comprising steps of:

(a) coding a non-volatile memory with a basic input output system (BIOS) code set, an operating system, a Transfer Control Protocol/Internet Protocol (TCP/IP) code set, an embedded Web Browser application, and a top managing application;

(b) connecting the nonvolatile memory to a CPU in a computerized set top box having the CPU, a video graphics circuit with an output driving a display monitor, and an Internet access link; and

(c) booting the computerized set top box from the BIOS code in the non-volatile memory directly into the top managing application, which establishes Internet access via the Internet access link, and provides a Browser Interface on the display monitor.

19. A method providing a CD-ROM subscription service, comprising steps of:

(a) soliciting subscribers having a set top box connected to a display monitor, wherein the set top box includes a CD-ROM drive and Internet access code;

(b) ascertaining interest categories of individual groups of subscribers;

(c) perusing Internet Web sites for sites fitting the interest categories of the individual groups of subscribers;

(d) coding the URLs of the Web sites of interest to the individual groups of subscribers on CD-ROM disks in a manner that, upon the disks being read in the CD-ROM drives, the Web sites are made available to the subscribers; and

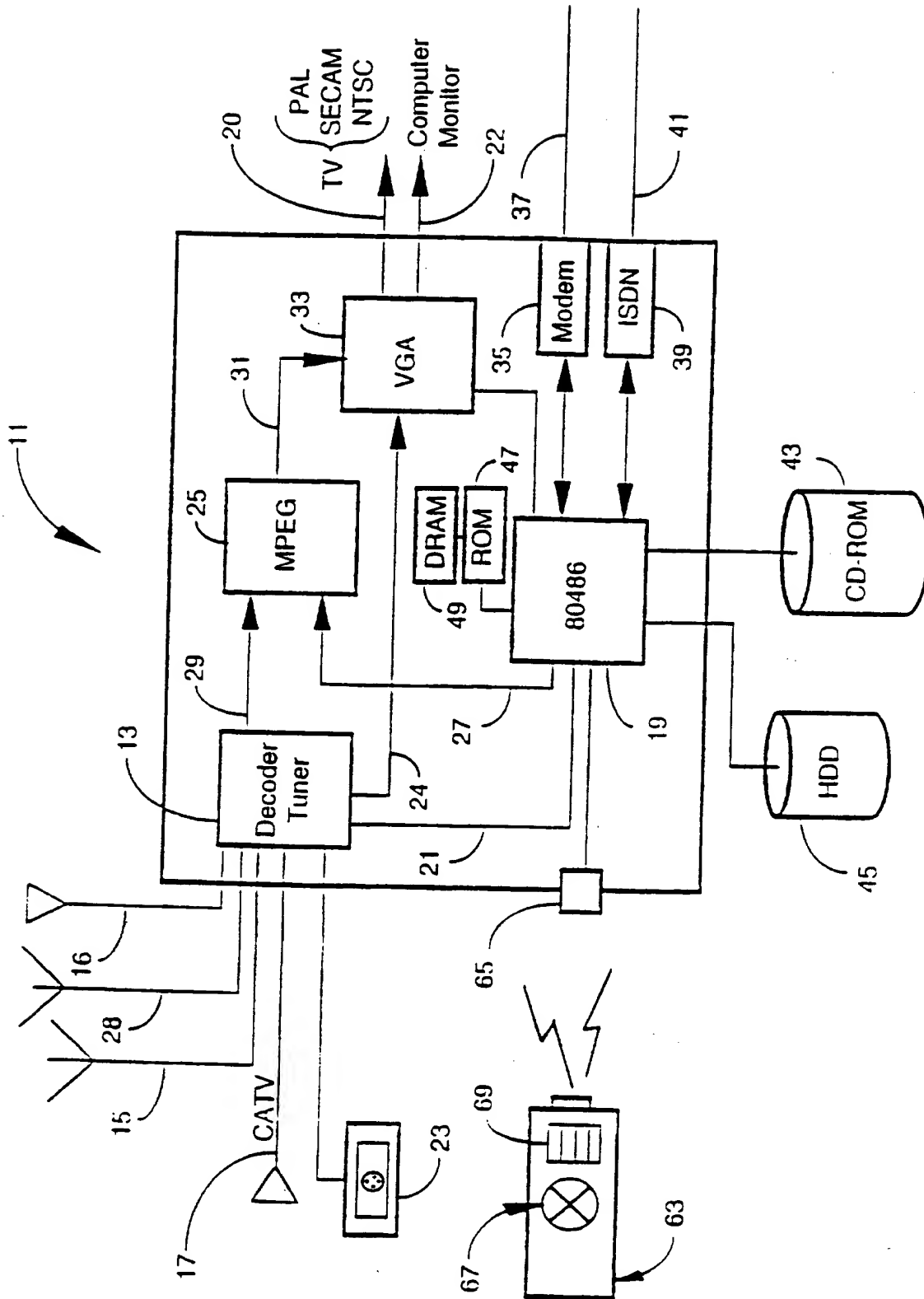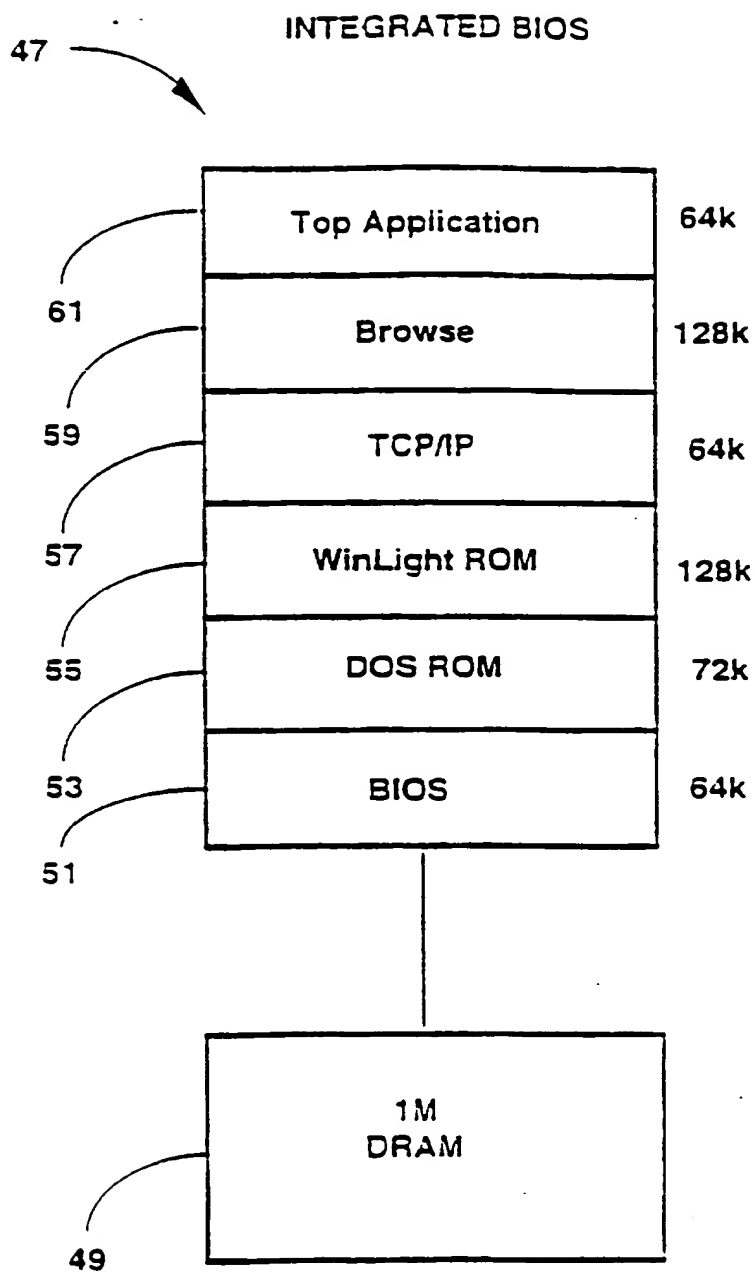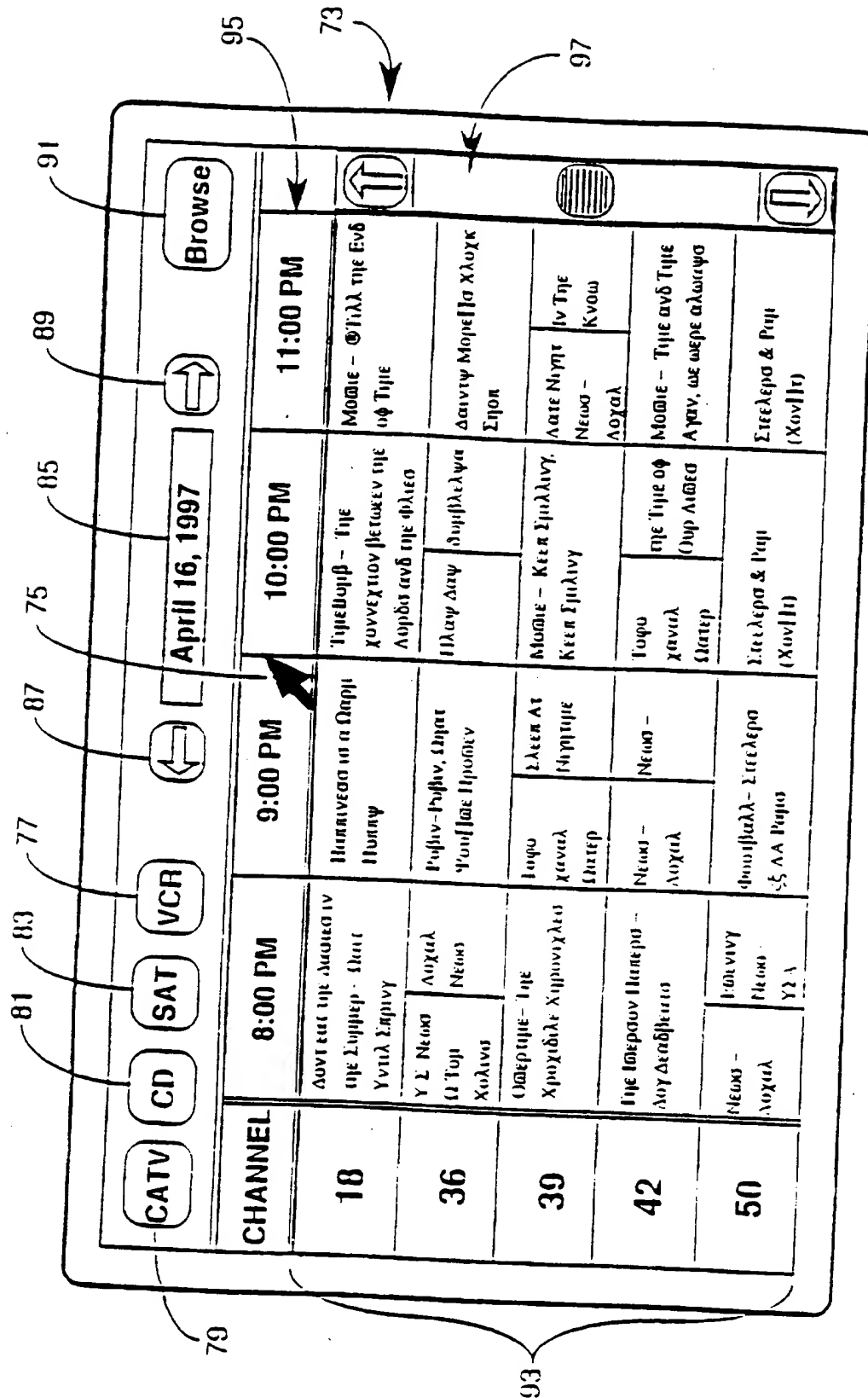(e) providing the CD-ROM disks to the subscribers.

Fig. 1

INTEGRATED BIOS

47

Top Application	64k
Browse	128k
TCP/IP	64k
WinLight ROM	128k
DOS ROM	72k
BIOS	64k

61

59

57

55

53

51

1M
DRAM

49

Fig. 2

Fig. 3

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US97/01554

A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) :G06F 9/00

US CL   : 395/652, 680

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. :   395/652, 651, 653, 680, 682

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

APS

search terms: set top, world wide web, web browser, internet

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X, P	US 5,572,643 A (JUDSON) 05 NOVEMBER 1996, col. 1, line 59 - col. 7, line 59.	1, 5, 7, 10, 13-19
Y, P	US 5,589,892 A (KNEE et al) 31 December 1996, col. 9, line 49 - col 14, line17.	2-4, 6, 8, 9, 12
A,T,E	US 5,625,781 A (CLINE et al) 29 APRIL 1997, col. 3, line 43 - col. 6, line 10.	1-19

☐ Further documents are listed in the continuation of Box C.   ☐ See patent family annex.

Date of the actual completion of the international search	Date of mailing of the international search report
29 MAY 1997	0 4 JUL 1997

Name and mailing address of the ISA/US	Authorized officer
Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231	KEVIN A. KRIESS
Facsimile No. (703) 305-3230	Telephone No. (703)305-9668

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